

## NAVIGATION.

## STAGE OF WATER IN RIVERS.

The highest and lowest stages of water observed at the Signal Service stations, during the month of January, 1883, are shown in the following table:

*Heights of rivers above low-water mark, January, 1883.*

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
<i>Red River:</i>					
Shreveport, La.	29 9	21, 22	18 11	8	14 9
<i>Arkansas:</i>					
Little Rock, Ark.		8	8 10	26, 27	1 0
Fort Smith, Ark.		6	0 0	23	2-3 4
<i>Missouri:</i>					
Yankton, Dak.*	20 0				
Omaha, Nebr.*	16 0				
Leavenworth, Kans.†	21 0	8	5 4	1	2 5
<i>Mississippi:</i>					
Saint Paul, Minn.*	14 6				
La Crosse, Wis.	18 0				
Dubuque, Iowa*	21 10				
Davenport, Iowa*	15 0				
Keokuk, Iowa†	14 6	1	13 10	3	12 8
Saint Louis, Mo.	30 0	1	8 10	12	4 5
Cairo, Ill.	40 0	30	30 7	9, 10	12 1
Memphis, Tenn.	31 0	31	22 5	12	7 11
Vicksburg, Miss.	41 0	31	22 7	1	11 8
New Orleans, La.†	—2 6	31	—9 4	1	—12 6
Port Eads, La.		18	9 11	11	7 11
<i>Ohio:</i>					
Pittsburg, Pa.	20 0	22	11 4	5	2 2
Cincinnati, Ohio.	50 0	24	31 7	9	10 0
Louisville, Ky.	24 0	25	12 3	10	6 0
<i>Cumberland:</i>					
Nashville, Tenn.	42 0	24	30 4	4	4 8
<i>Tennessee:</i>					
Chattanooga, Tenn.	31 0	24	38 8	4	3 10
<i>Monongahela:</i>					
Pittsburg, Pa.	29 0	22	11 4	5	2 0
Morgantown, W. Va.	28 0	17	15 2	12	1 2
<i>Savannah:</i>					
Augusta, Ga.		22	30 10	4	7 5
<i>Willamette:</i>					
Portland, Oreg.		31	15 0	23	1 4
Umatilla, Oreg.		12, 13	3 5	5, 6	2 6
<i>Sacramento:</i>					
Red Bluff, Cal.		25	2 10	15	1 1
Sacramento, Cal.		25	12 2	23	8 1
<i>Mobile:</i>					
Mobile, Ala.		20	18 0	9	14 9
<i>Colorado:</i>					
Yuma, Ariz.		3, 4	16 4	30, 31	15 2

\* Frozen. † Frozen part of month. See text. ‡ Below high-water mark of 1874.  
‡ Below bench-mark.

The Mississippi river remained frozen during the month at all stations north of Keokuk, Iowa; at that station it was frozen on and after the 4th. At Saint Louis, Missouri, the highest water was observed on the 1st; at Cairo, Illinois, on the 30th; at Memphis, Tennessee, Vicksburg, Mississippi, and New Orleans, Louisiana, on the 31st; and at Port Eads, Louisiana, on the 18th. It did not approach the danger-line at any of the stations named.

The Missouri river was frozen from the 1st to 31st, at Omaha, Nebraska, and at stations north of that place; at Leavenworth, Kansas, from the 9th to the close of the month; and at Brunswick, Missouri, after the 4th.

The Ohio river reached its highest stage from Pittsburg, Pennsylvania, to Louisville, Kentucky, between the 22d and 25th.

The Tennessee river at Chattanooga rose to thirty-eight feet, eight inches, on the 24th, or seven feet, eight inches, above the danger-line.

The Savannah river at Augusta, commenced to rise rapidly on the 6th, and on the 7th, had reached twenty-seven feet, after which it continued falling until the 17th; on the 18th, a second and sudden rise began, and on the 22d, rose above the danger-line to thirty feet, ten inches, but commenced falling during the night.

## FLOODS.

Palestine, Texas, 26th.—Very heavy rain storm occurred at Huntsville, about ninety-two miles south of Palestine, on the Houston division of the International and Great Northern railroad, washing away a bridge and three cars.

Nashville, Tennessee, 21st.—The low-lands in the northern

part of the city are flooded to a depth of several feet; no damage has resulted.

Chattanooga, Tennessee, 21st.—A rapid rise in the river has occurred, caused by melting snow in the mountains. At 3 p. m. the river rose to the danger-line (thirty-one feet above low-water). The river continued rising until the 24th, reaching a height of thirty-eight feet, eight inches, after which it fell rapidly; no damage resulted from the high-water. On the 25th, the river was again below the danger-line.

Augusta, Georgia, 22d.—The river rose to thirty feet, ten inches, causing suspension of operations at the cotton mills. The cellars in the lower parts of the city were flooded, resulting in much inconvenience and loss. On the 23d, the river began falling.

Weldon, North Carolina, 9th.—The Roanoke river rose to the level of its banks on this date, but began to recede during the night. 23d, the river has risen during the past few days, and has overflowed the adjacent bottom-lands. The mills have been compelled to suspend operations on account of the high water. The river reached its highest point at noon of this date, and began falling.

## HIGH-TIDES.

During the progress northeast along the coast of low pressure vii, the northeasterly winds in its front produced high-tides, as follows:—

Cape Lookout, North Carolina, 9th, 10th; Portsmouth, North Carolina, 9th, very high, island covered; Ocean City, Maryland, 10th; Cape May, New Jersey 10th; Sandy Hook, New Jersey, 10th, 11th.

## LOW-TIDES.

During the 8th, a severe norther prevailed along the western Gulf coast, and produced at Indianola, Texas, on the 9th, very low tide; small vessels of light draught were unable to pass out of the bayou.

## ICE IN RIVERS AND HARBORS.

*New Haven harbor.*—New Haven, Connecticut: 23d, harbor frozen with the exception of a narrow passage opened by steamboats.

*Narragansett bay.*—Narragansett Pier, Rhode Island: 28th, 29th, and 30th, large fields of ice passed out of bay.

Newport, Rhode Island: 24th, considerable ice formed in harbor during night; 25th, ice melting, harbor nearly clear.

*Casco bay.*—Portland, Maine: 11th, ice forming in harbor; 13th, harbor nearly filled with ice; 14th, ice broken up in harbor.

*Thames river.*—New London, Connecticut: 25th to 29th, ice formed around the docks.

*Block Island harbor.*—Block Island, Rhode Island: 23d, harbor frozen, but vessels were not prevented from passing through.

*New York harbor.*—New York City: 12th, floating ice; 14th and 16th, ice in harbor; 23d, 24th, and 25th, floating ice; 27th, very thick ice in harbor.

*Lake Champlain.*—Burlington, Vermont: 5th, navigation closed; 23d, lake frozen inside the breakwater; 26th, lake frozen over, being an earlier closing than for many years.

*Saint Croix river.*—Calais, Maine: 26th, the river is frozen from the lower steamboat wharf to Red Beach, nine miles below, for the first time in many years.

*Hudson river.*—Newburg, New York: 12th, the river is frozen over at this place; ice from three to five inches thick.

*Barnegat bay.*—Barnegat, New Jersey: 11th, the strong ebb-tide loosened a large ice-floe at the head of the bay, which in passing down struck the schooner "Margaret Amelia," breaking both anchor chains; she was run ashore and will prove a total loss, excepting the cargo.

*Niagara river.*—Niagara Falls, Ontario: 22d, an ice bridge formed on this date. During its formation, the ferryman's house was lifted and turned over on its side. Forty feet of the inclined railroad on the American side were torn away and buried beneath the ice. Fort Niagara, New York: 22d, river frozen over.

*Patapsco river.*—Baltimore, Maryland, 24th: navigation interrupted to some extent by ice in the harbor and river; 27th, ice broken up by boats, navigation unobstructed; 30th, considerable ice was driven by wind from the bay into the harbor and river, causing interruption to navigation.

*Monongahela river.*—Pittsburg, Pennsylvania: 19th, river full of floating ice at this place, and reported to be breaking in the upper Monongahela; 23d, ice passed out without causing damage.

Morgantown, West Virginia: 4th, river frozen over below the suspension bridge; 12th to 14th, river frozen; 15th, 16th, and 18th, ice-gorge; 19th, ice broken up and moved out.

New Geneva, Pennsylvania: 12th, heavy floating ice, boats stopped; 23d, 24th, 25th, and 28th, heavy floating ice.

*Ohio river.*—Pittsburg, Pennsylvania: 20th, large quantities of ice running, river rising rapidly; 21st, coal barges were compelled to leave during the morning to prevent destruction by the ice.

Louisville, Kentucky: 18th, navigation which had been partly suspended on account of floating ice since the 11th was resumed on this date.

Cincinnati, Ohio: 14th, 15th, 16th, floating ice in river.

Cairo, Illinois: 12th to 28th, light flow of ice, not sufficient to interrupt navigation.

Vevay, Indiana: 27th, floating ice.

Portsmouth, Ohio: 14th, 15th, 25th, 26th, 27th, floating ice, obstructing navigation on the last-mentioned date.

Wheeling, West Virginia: 3d to 7th, floating ice; 15th to 20th, ice-dam; 21st, ice broke up in river, no damage resulted.

*Tennessee river.*—Paducah, Kentucky: 11th to 26th, floating ice in river.

*Youghiogheny river.*—Confluence, Pennsylvania 14th: to 31st, river frozen.

*Lake Erie.*—Cleveland: 1st, lake frozen along the shore; 4th, lake frozen as far as the eye can reach; 17th, ice on lake seventeen inches thick.

*Detroit river.*—Detroit, Michigan: 1st to 12th, heavy masses of floating ice; 13th to 29th, solid ice; 21st, ice from three to four feet in thickness; 30th, ice began to move at 3 p. m.; 31st, southerly winds drifted the ice along the Detroit shore, leaving the Canadian shore clear until after noon, when it again extended from shore to shore, being piled up in places to a height of twelve feet.

*Oswego river.*—Oswego, New York: 10th, river frozen from the railroad bridge to the mouth.

*Mackinac straits.*—Mackinac City, Michigan: 4th, straits partly frozen over; 5th, ice drifted along the shores by the wind; 6th, ice blown out of straits; 7th, the schooner "Fleet-wing" put in port, having been badly damaged by ice; 8th, straits frozen over; 10th, ice broken up and blown out by wind; 11th, 12th and 13th, straits full of ice; 14th, straits frozen over, steamer "Algomah" stuck in middle of straits; 16th, teams crossing on ice.

*Little Bay de Noquet.*—Escanaba, Michigan: 31st, bay frozen throughout the month.

*Grand river.*—Grand Haven, Michigan: 4th, river frozen over; 12th, river clear of ice; 14th, heavy masses of drift ice have appeared at mouth of river and is pushing up the stream, rendering navigation very unsafe; 15th, river again closed by drift ice, and in the lower part of the river the ice is reported to extend from six to twelve feet below the surface; 21st, river frozen; 22d, steamer "Wisconsin" ice-bound and compelled to remain at her moorings.

*Saint Clair river.*—Port Huron, Michigan: 4th to 8th, heavy ice in river; 22d and 23, river frozen firmly from shore to shore opposite this city; 25th, pedestrians crossing on the ice.

*Lake Huron.*—Port Huron, Michigan: 9th, a large ice bridge formed at the base of the lake, and extended diagonally across from Fort Gratiot light-house to Point Edwards, on the Canadian shore; it broke on the 12th and formed again on the 16th.

*Lake Superior.*—Duluth, Minnesota: 2d, lake frozen for a distance of half a mile from shore; 7th, ice carried out by the

wind during the evening; 12th, large fields of ice blown in by the wind; 13th, ice again blown out; 14th, lake frozen; 21st, all ice carried out, except for a distance of about five hundred feet inside the breakwater; 24th, lake frozen as far as the eye can reach.

Marquette, Michigan: 3d, harbor frozen over.

*Mississippi river.*—Davenport Iowa: 31st, the river remained frozen at this place and at all points above throughout the month.

Dubuque, Iowa: 3d, the ice in the channel measured eight inches in thickness.

Cairo, Illinois: 31st, heavy flow of ice in the Mississippi during the month with occasional gorges; navigation closed north of this city.

La Crosse, Wisconsin: 30th, ice in river measures twenty-eight inches.

Keokuk, Iowa: 4th, river frozen over; 11th, teams crossing on the ice.

Saint Louis, Missouri: river full of floating ice on 2d, 3d, 5th, 6th, 7th, 9th, 10th to 16th, 21st, 23d to 29th; 30th, river clear, navigation resumed.

Clinton, Iowa: 31st, ice in river from twenty to twenty-six inches thick.

Muscatine, Iowa: 1st, ice six inches thick in channel, teams crossing; 31st, ice twenty inches thick.

Saint Paul, Minnesota: 15th, ice in river twenty-one inches thick.

*Missouri river.*—Leavenworth, Kansas: 1st to 8th, floating ice; 9th to 31st, river frozen.

Saint Joseph, Missouri: 31st, river frozen at this place, and at all points north throughout the month.

Brunswick, Missouri: 4th to 31st, river frozen.

*Yellowstone river.*—Fort Keogh, Montana: river frozen over during night of the 8th.

*Willamette river.*—Umatilla, Oregon: 2d, river frozen along the shores to a thickness of three inches; 1st, 3d, 4th, 17th and 18th, floating ice; 31st, during the past week, ice from eight to ten inches thick has been cut in the river.

*Sacramento river.*—Sacramento California: 20th, ice on the bars in river sufficiently thick to bear the weight of boys.

Folsom City, California: 20th, floating ice; very unusual occurrence at this place.

*Embarrass river.*—Charleston, Illinois: 31st, ice in river about ten inches thick.

*Grand Traverse bay.*—Northport, Michigan: 31st, bay entirely frozen over.

*Kansas river.*—Salina, Kansas: 20th, ice in river ten inches thick.

Topeka, Kansas: 31st, ice in river twelve inches thick.

*Susquehanna river.*—Catawissa, Pennsylvania: 31st, the north branch of the Susquehanna was closed during the month with ice from twelve to thirteen inches thick.

*Arkansas river.*—Little Rock, Arkansas: 22d, river reported to be frozen over sixty miles north, and is full of floating ice at this station.

Fort Smith, Arkansas: 9th, 21st, and 22d, floating ice in river.

*Miscellaneous.*—Wicklow, Dakota: 15th, ice on lake twenty-five inches thick; 31st, ice twenty-nine inches thick.

Thornville, Michigan: 31st, ice on ponds in vicinity ten inches thick.

Port Huron, Michigan: 4th, ice harvested from Black river from eight to nine inches thick.

Palermo, New York: 31st, ice in ponds in vicinity twenty inches thick.

#### TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors, at the Signal Service stations, with the average depth at which the observations were made, are given in the table below. In this table are also shown the highest and lowest observed water temperatures of the month, with the monthly ranges, and the monthly mean temperature of the air for the various stations.